The observations of the third will be seen to follow, though somewhat roughly, this portion of the curve for the month. The means of the third and fourth show a greater divergence from the monthly curve, and so on through the combinations, each successive combination showing instead of a continued approximation to, a continually increasing divergence from, the mean hourly variation of the month. It is this consideration, to which Gen. Strachey does not appear to have given due weight in his paper, which has led Meldrum and others in their investigation of periodicities of the rainfall and temperature, to extend their inquiries not only over lengthened intervals of time, but also over as wide areas as possible.

It may be added, that this new criterion of a periodicity enunciated and applied by Gen. Strachey at a meeting of the Royal Society in May last would, were it accepted, equally sweep from our view scores of periodicities now everywhere accepted, and effectually foreclose inquiry in many fields of research in which science is certain to reap brilliant results, namely, in those departments of research in which the non-periodical are very largely in excess of the periodical variations, of which meteorology may be regarded as presenting the most numerous and best illustrations.

GEOLOGICAL NOTES

GERMAN GEOLOGICAL SURVEYS—(1) AUSTRIA.—The programme of the Austrian Geological Survey for this year shows that the work is advancing, as it has been doing for some time past, mainly in two directions, one lying on the extreme east, the other on the far west of the empire. In the Tyrol two sections or parties are in the field; one of these, under Dr. Stache, and Mr. F. Teller, is investigating the crystalline masses of the Central Alps along both sides of the Vintschgau; the other, under Dr. E. v. Mojsisovics and Messrs. M. Vacek and A. Bittner, is engaged among the sedimentary formations between Botsen and the Venetian frontier. On the other side of the empire, in Eastern Galicia, Bergrath C. M. Paul and Messrs. Tietze and Lenz are busy among the Carpathians and their spurs to the south of Stanislawow. The vice-director of the Survey, Bergrath D. Stur, will also this year publish his researches on the flora of the Carboniferous period. The whole of the operations of the Survey are controlled and directed by the able hands of Ritter von Hauer.

(2) PROVINCE OF PRUSSIA.—Besides the national survey organised and paid by the government for the investigation of the geological structure of the kingdom of Prussia, there is in progress under the auspices of the Physical-Economical Society of Königsberg a geological investigation of the Province of Prussia with the publication of a map on the scale of $\frac{1}{100000}$. It might seem at a first glance that this wide alluvial plain could hardly offer much opportunity for geological observations or for much variety of colouring on the map. But by means of careful examination of the surface and well-arranged borings below it, much valuable information is being obtained regarding the structure and history of the alluvial, peaty, and drift deposits of the Baltic plain of Prussia. The lively interest which has been raised on all sides by the undertaking has suggested the idea to publish yearly an account of the progress of the work with notices of the more interesting observations and discoveries, and such additional information from other investigators or from other countries as may throw light upon the geological history of the province. Dr. Alfred Jentsch has prepared the first *Jahresbericht*, which appears in the *Transactions* of the Physical-Economical Society. After a brief account of the preparation of the map, and of the various boring operations he gives an interesting *résumé* of the geology and physical geography of East Prussia, including the variations of water-level in the Vistula and Pregel, the peat-mosses, marls, alluvial clays, drifts, brown-coal, and amber-deposits, with the cretaceous, Jurassic, and palæozoic rocks made known by boring explorations.

GEOLOGICAL SURVEY OF NEWFOUNDLAND.—Mr. Murray has published a second edition of the Index Geological Map of Newfoundland on the scale of twenty-five miles to an inch. It is of course brought up to date, and exhibits with great clearness the distribution of the various rocks of the colony. The remarkable serpentines, slates, and metamorphic rocks overlying the sandstones of the Quebec group on the west side of the island, are so inserted as to show distinctly their unconformable relations to the rocks below them. Four sections are likewise placed upon the map for the explanation of the geological structure of different regions. The map, in regard to execution, is all that could be desired, considering its small scale and provisional character. Mr. Murray's Report for 1876 has just been issued. The ice which hugged the coasts so late last year prevented a start being made until the end of June. During the few months available for exploration, Mr. Murray and Mr. Howley succeeded in mapping some portions of the interior about the Gander and Gambo rivers. As usual the routes lay along the river-courses where almost the only geological observations can be made, the intervening country being covered with swamps or forests. The Report shows that considerable areas of good agricultural land lie in the interior, and that while large masses of valuable timber exist they need to be guarded against the ignorant and wanton operations of lumber-men.

CHEMICAL NOTES

NEW CHROMIUM AND MANGANESE COMPOUNDS.—Some new compounds of chromium and manganese have lately been prepared and examined by Mr. J. B. Hannay, who has communicated a paper on the subject to the Glasgow Philosophical Society. On examining any general list of carbon compounds it is to be remarked that, however complicated their structure, they are not as a rule decomposed by water; on the other hand complex compounds of other elements are as a rule decomposed by this substance into two or more simpler compounds. Mr. Hannay was therefore induced to examine whether carbon is or is not the only element capable of forming series of bodies of complicated structure; and whether the existence of water on this earth is the reason of our not having complex bodies with other elements than carbon for their basis. The plan adopted was to take some complicated substance (containing no carbon) which is decomposed by water, find a solvent for it, and act on it with other reagents out of contact of air and moisture. The substance used was oxychlorid of chromium, (CrO_2Cl_2), and the solvents employed, carbon disulphide and carbon tetrachloride. Mr. Hannay has devised an apparatus which allows of the substance being precipitated, filtered, washed, dried, and weighed off for analysis without coming in contact with air or moisture. The following is a list of the chromium compounds prepared by him:—

$Cr_2Cl_4SO_3$.	$Cr_4Cl_6S_3$.	$Cr_3Cl_6P_2Br_6O_2$.
$Cr_2Cl_4SO_2$.	$Cr_4Cl_6S_3O_4$.	$Cr_3Cl_6P_4O(H_2O)$.
$Cr_2Cl_4Br_2$.	$Cr_4Cl_6S_3O_{12}$.	$Cr_3Cl_6P_4$.
$Cr_2Cl_4S_2O_2$.	$CrCl_2S_2.H_2O$.	Cr_3Cl_6PCl.
Cr_2Cl_6S.	$CrCl_2S_2$.	Cr_3Cl_6PBr.
$Cr_2Cl_4Br_2S$.	$CrCl_2PSO$.	$(Cr_3Cl_6P)_2O$.
$Cr_2Cl_4S_2$.	$Cr_3Cl_6P_4O_6$.	Cr_3Cl_6P.
	$Cr_3Cl_6P_4O_2$.	

Mr. Hannay has prepared some analogous manganese compounds, but the analyses of these have not as yet been finished.

COMPLEX INORGANIC ACIDS.—Dr. W. Gibbs has lately obtained a series of new inorganic acids formed

on the type of the silico-tungstic acids obtained by Marignac. The new series of salts contain platinum instead of silicon, and the salt $10WO_3PtO_24Na_2O + 25\ H_2O$ has been obtained by boiling platinic hydrate $Pt(OH)_4$ with acid sodic tungstate. Two metameric sodium salts have been obtained, one of an olive-green colour, the other honey yellow with an adamantine lustre. The corresponding potassium and ammonium salts of this platino-tungstic acid have also been obtained, but they belong to the yellow series. Mr. Gibbs has not as yet obtained salts corresponding to Marignac's twelve atom silico-tungstates. Acid molybdate of sodium also dissolves $Pt(OH)_4$, giving a green solution, which appears red when viewed in thick layers; the only salt of this series studied, crystallises in amber tabular plates having the composition $10MO_3PtO_24Na_2O + 25H_2O$. He is endeavouring to generalise the results by substituting other hydrates, such as $Zn(OH)_4$, $Ti(OH)_4$, $Sn(OH)_4$, but has, as yet, in these cases not obtained very definite results. He is also engaged in examining the phospho-tungstic acids containing $20WO_3$ obtained some time ago by Scheibler.

A SUPPOSED NEW METAL "DAVIUM."—The discovery of this new element is reported from St. Petersburg by Serjius Kern. It was found by him in the residues of platinum ores after treatment to separate out the metals of the platinum group. The specific gravity of the metal is given as 9·385 at 25°. The author supposes this new metal to occupy an intermediate position between molybdenum and ruthenium, but very strong evidence will be necessary to confirm the existence of a new metal belonging to the platinum group.

EFFECT OF PRESSURE ON CHEMICAL ACTION.—M. Berthelot, in a recent number of the *Bull. Soc. Chem.*, calls attention to the fact that some experiments lately made by Quincke have confirmed a statement made by the former chemist some time ago, that the evolution of hydrogen from zinc and sulphuric acid is not arrested by pressure. The experiments of Quincke show that when these bodies are brought in contact, the pressure of the hydrogen evolved rose in a few days from 1·5 to 10 atmospheres, and in a very much longer time from 25 to 126 atmospheres. Berthelot thinks that these experiments, although not performed for this purpose, prove that chemism is not modified, but only the nature and extent of the surfaces attacked. The evolution of gas would thus go on indefinitely, not arrested, but only modified in rapidity.

AMOUNT OF OXYGEN CONTAINED IN SEA-WATER AT DIFFERENT DEPTHS.—At a recent meeting of the Royal Society of Edinburgh Mr. J. Y. Buchanan communicated some results obtained from his experiments on the above subject during the cruise of the *Challenger*. Mr. Buchanan finds that at the surface the amount of oxygen varies between 33 and 35 per cent., the higher numbers having been observed in a water collected almost on the Antarctic circle; the smallest percentages have been observed in the trade-wind districts. In bottom waters the absolute amount is greatest in Antarctic regions, diminishing generally towards the north. The oxygen percentage is greatest over "diatomaceous oozes," and least over red clays containing peroxide of manganese; over "blue muds" it is greater than over "globigerina oozes." In intermediate waters the remarkable fact was observed that the oxygen diminishes down to a depth of 300 fathoms, at which point it attains a minimum, after which the amount increases. The following figures show the nature of this phenomenon :—

Depth (fathoms)	0	25	50	100	200	300	400	800	Between 800 and the bottom.
Oxygen (O + N = 100)	33·7	33·4	32·3	30·2	33·4	11·4	15·5	22·6	23·5

It is evident from these figures that between 200 and 400 fathoms there is a great consumption of oxygen going on, and, as it is difficult to conceive its being consumed otherwise than by living creatures, the conclusion may be drawn that animal life must be particularly abundant and active at this depth, or at least more abundant than at greater depths; for, at less depths, there is more opportunity of renewal of the oxygen by reason both of the greater proximity to the surface and of the existence of vegetable life. This conclusion is borne out by the experiments of Mr. Murray with the tow-net at intermediate depths, which go to prove the existence of abundance of animal life down to 400 fathoms, vegetable life never extending much below 100 fathoms. Below 400 fathoms life is sparingly met with.

OUR ASTRONOMICAL COLUMN

THE TOTAL SOLAR ECLIPSE OF 1605, OCTOBER 12.—It is known that Clavius attributed the ring of light which he observed round the moon during the eclipse of April 9, 1567, about the time of greatest obscuration at Rome, to the circumstance of the sun's disc not being entirely covered by our satellite, a narrow rim of light thereby remaining visible. As Prof. Grant relates, in his "History of Physical Astronomy," Kepler maintained that the luminous ring seen by Clavius could not have been the margin of the solar disc, because he found by calculation that the moon was at her mean distance from the earth, when her apparent diameter exceeds that of the sun, even in perigee; and when a similar ring of light was remarked round the moon during the eclipse of February 25, 1598, and attributed to the same circumstance, Kepler again pointed out that such an explanation was inadmissible, the moon's apparent diameter, on this occasion also, exceeding that of the sun. These opinions were expressed by Kepler in his work "Ad Vitellionem Paralipomena," published in 1604, and Prof. Grant remarks that an eclipse in the following year strikingly confirmed them. This refers to the eclipse of October 12, 1605, observed at Naples, of which Kepler writes thus: (*De Stella Nova in pede Serpentarii*, p. 116) "the whole body of the sun was effectually covered for a short time. The surface of the moon appeared quite black, but around it there shone a brilliant light of a reddish hue, and uniform breadth, which occupied a considerable part of the heavens." We follow Prof. Grant's translation of this passage, which clearly proves that the eclipse was total for a brief interval at Naples.

As the eclipse of 1605 first confirmed the accuracy of Kepler's views, in opposition to those of Tycho Brahé, who disputed the possibility of a total eclipse of the sun, it may not be without interest to examine the circumstances of the phenomenon as it would be observed at Naples. For this purpose the same system of calculation adopted for other eclipses mentioned in this column, is followed. The elements are :—

G.M.T. of Conjunction in R.A. 1605, Oct. 12, at 0h. 31m. 44s.

	° ′ ″
R.A.	197 14 51·0
Moon's hourly motion in R.A. ...	35 37·1
Sun's ,, ,, ,, ...	2 19·1
Moon's declination	6 40 27·9 S.
Sun's ,, ...	7 31 32·5 S.
Moon's hourly motion in decl. ...	10 50·2 S.
Sun's ,, ,, ,, ...	0 56·4 S.
Moon's horizontal parallax	59 21·2
Sun's ,, ,, ...	8·9
Moon's true semi-diameter	16 10·4
Sun's ,, ,, ...	16 3·9

The eclipse would therefore be central with the sun on the meridian in long. 11° 18′ W. and lat. 52° 26′ N., and the following would also be points upon the central line :—

Long. 19° 9′ E., lat. 39° 32′; and long. 14° 23′ E., lat. 40° 48′.